

Implementation of self-education principles as a background of quality professional education

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Abstract— Education is an important component of the life of every society member. Studying in educational institutions alone is not, however, enough in order to be successful. This is the reason why self-education has become widespread. The aim of this work was to study the implementation of the self-education principles in specialized education, focusing on the principles of regularity, consistency, the relationship between self-education with education and self-education with professional activities. This aim was achieved through a pedagogical experiment conducted in general secondary and higher educational institutions, as well as through surveys of pupils, students, nursery school teachers, school teachers and lecturers/professors. Statistical data on the dynamics of the teaching staff of educational institutions were analysed through mathematical methods. The experiment found that the introduction of methods that contribute to the development of self-educational competence, self-control and self-organization in educational institutions also has a positive effect on the academic performance of pupils and students. These methods improve cognitive activity and increase motivation of educational activities, social interaction and purposefulness, point out gaps in acquired knowledge and help to implement a differential approach. The study demonstrated that self-education should be consistent and regular, starting with general secondary education and accompanying specialists throughout their professional carriers. finding effective teaching methods that can be used in educational institutions at different levels and that contribute to the development of skills and abilities to independently improve acquired knowledge may be the subject of further research.

Keywords: consistency, regularity, professional activity, learning, teaching methods, self-educational competence, motivation.

I. INTRODUCTION

Lifelong learning is one of the basic principles of sustainable development. At the beginning, a person obtains education through activities clearly defined and managed by the curricula of preschool, general secondary and higher education educational institutions. It is not always the case that a specialist can work effectively all his life after graduation using only the knowledge, skills and abilities that were acquired and developed at the university. It is not enough today to be able to read, write and have knowledge on certain issues in order to be successful. The rapid pace of technology development and large information volumes require specialists to recurrently update their knowledge and learn to use it in different conditions and situations. Continuous on-the-job education is impossible. Therefore, the educational institutions of all levels face an urgent task to teach pupils/students to get an education on their own, while stimulating and supporting them. This process may involve different forms, methods, tools and technologies of learning. The teacher, who is the organizer of the student’s self-education process, plays an important role. He/she must take into account, among other things, the educational needs and individual characteristics of each student, rapidly changing societal requirements for the education system. Therefore, the teachers themselves must engage in self-education and constantly improve their professional level.

The issue of adherence to the self-education principles in obtaining quality specialized education is still insufficiently studied, although there are many works that deal with the study of self-education in the scientific literature. The aim of this

work was to study the implementation of the principles of regularity, consistency, the relationship between self-education with education and self-education with professional activities. The aim involved the following objectives:

- 1) Find out how teaching methods that promote the development of self-educational competence affect the academic performance of pupils and students, as well as the motivation for educational activities, providing a differential approach and social interaction;
- 2) Carry out an assessment of self-educational competence by pupils, students, teachers and lecturers/professors;
- 3) Establish a link between self-education and education;
- 4) Analyse the role of the principles of regular and consistent self-education in specialized education;
- 5) Study the relationship between self-education and professional activities.

II. LITERATURE REVIEW

Many foreign [1, 2] and Ukrainian [3, 4] scholars studied the issue of self-education. Among other matters, the impact of various psychological technologies on the development of student self-education was studied [3], and tools for adult self-education were examined [5]. It was proved that self-study promotes the development of students' planning, learning skills and forecasting the results of work performed.

The scientific literature provides different definitions of self-education [1, 6]. In this paper, self-education is supposed to mean the process of independent acquisition of new knowledge and improvement of existing skills motivated by improving the professional quality.

The self-education principles include: regularity [7], consistency [4], the relationship between education, self-education and professional activities [8].

The development of self-education competencies while studying at university is enshrined in some countries, such as China [9] at the political level in educational reform programmes, which provide for changes in university curricula. Besides, creating favourable conditions for self-education involves not only politicians [10] and educational institutions [11], but also various organizations, entrepreneurs, local communities, etc. [12].

The skills that future specialists need for self-education are developed in higher educational institutions through teaching methods that involve independent active work of students (case methods [3], project method, brainstorming [13], use of media resources [14, 15], educational platforms [16], building the block-modular learning process [17], comprehensive use of ICT [18], as well as independent work that is part of the curriculum [3].

The development of self-learning skills is also promoted by electronic courses developed by teachers, which include texts and videos of lectures, assignments for self-control and self-completion, tests and electronic methods of assessing the level of students' knowledge [14]. Active learning methods and research activities of pupils/students contribute to the

development of self-education skills [13]. The latest technologies also play an important role in self-education [14]. They provide unlimited access to the constantly updating information.

How well a specialist in a particular field will perform his/her professional duties depends on the ability to study independently acquired during studentship. The authors [19] showed the ways to acquire self-education competence while studying at university, as well as continue to develop independently throughout professional life. Both formal and non-formal learning can be involved. This competence determines a person's ability to make own judgments, his/her evaluation of his/her own activity, the ability to enrich his/her own experience, plan, regulate and engage in self-education. The development of skills and abilities necessary for self-education provide for a regular organization of self-learning in educational institutions [7], teaching pupils and students to work with information [20], being attentive to it, distinguishing it in terms of importance, reliability. Besides, the so-called self-leadership, that is the ability to self-organize, is a necessary condition for self-education [21].

Researcher [6] offer nursery school teachers and teachers to create situations during classes that may occur in everyday life, so that pupils/students learn to resolve them using existing knowledge, skills and abilities for the development of skills necessary for self-education. These technologies are called imitation and non-imitation game educational technologies in the scientific literature [6].

Special educational programmes are created for involving students in self-education, which include, among other things, consultations, group and individual discussions [6]. This stimulates students to self-education and introduces the necessary tools for that purpose. Self-education provides the following advantages: responsiveness of the individual peculiarities of each student, increasing the level of students' academic performance and promoting the development of highly qualified specialists in the field as a consequence. Properly built learning process with a focus on the development of self-educational competence allows students to learn to adapt quickly to rapidly changing conditions and to get education on their own. Students also develop critical thinking, the ability to work with different information. Under such conditions, students develop communication skills and cooperation with people belonging to different social groups [17].

Effective technologies for the development and assessment of competencies are important at the stage at which the qualities necessary for future professional activity are developed. The problem of assessing self-education skills occupies an important place [22], which include not only knowledge and skills, but also the ability to apply them in other conditions.

Self-educational competence has certain features: self-knowledge and self-analysis of the advantages and disadvantages of one's own activities, the adequacy of

knowledge for solving urgent problems; the ability to plan self-education with a view to the situation, opportunities and needs; the ability to analyse information; apply critical thinking in a rapidly changing world to fulfil professional objectives; digital literacy [23] and information culture; ability to achieve results of self-education, present and prove them; ability to interact with employees and respect the opinion of others; sense of responsibility; sustainability of the self-education process despite the hesitations and difficulties; understanding the need of self-education for professional growth [24].

Self-education has a different nature at different stages of personality development [24]: it is reflexive, unconscious in schoolchildren. Students have an externally motivated self-education. In professional activities, employee self-education becomes intrinsically motivated. Besides, it is proved that unconscious self-education is less effective than regular and conscious one [8].

It is believed that self-education process is possible outside educational institutions only [25]. It may involve the teaching methods inherent in institutional training. Researcher [25] developed a plan for the transition from traditional education to the one that can help develop the skills needed for self-education. The study of the professors' biography helped establish what life factors may have influenced the development of self-education skills. It was also examined how these factors contributed to success in professional activities [26].

Researchers studied the role of self-education in various fields. Self-education, along with four other criteria such as professionalism, responsibility, cooperation and flexibility, is, however considered to be key in teacher training [19]. Teacher self-education is important because a teacher who is able to engage in self-study will be able to teach his/her students how to learn throughout life [1]. This will allow students to change quickly according to the changes dictated by their environment. In this process, the teacher must take into

account the individual peculiarities of each student.

Besides, teacher self-education is a must because the rapid development of technology and society dictates that the teacher has to teach each new generation of students something new, something different [2]. Other teaching methods shall be used in this case that take into account new features that are typical for the current generation of students only. Teachers' professional development requires a constant search for new directions and technologies, relevant content and effective forms [4]. Teacher education is based on teacher self-education, on developed teacher training programmes and the organization of continuing teacher education.

The sources that teachers can use in self-education were identified [2]. These include literature, television, the Internet [27], seminars, conferences, training courses, various events that promote the exchange of experiences and self-development. Self-education may be realized both individually and in groups. The results of self-education to be expected from teachers are also listed: improved teaching level, publishing instructional research, developing didactic materials, sharing experience with colleagues through speeches and reports, as well as conducting trainings, workshops, etc.

Not only intelligence but also creativity are important teacher's personal qualities for his/her successful self-education and productive further professional activity, regardless of the subject that he/she teaches [28].

III. METHODS

The following self-education principles are considered in this study: regularity, consistency, the relationship between self-education with education and self-education with professional activities (Table 1).

Table 1. Research methods for the implementation of the self-education principles

Self-education principle	Research method
The relationship between self-education and education	Pedagogical experiment
	Self-Educational Competence Assessment Questionnaire
The relationship between self-education and professional activity	Questionnaire for teachers, nursery school teachers, lecturers/professors
	Statistical Data Analysis Methodology (Ministry of Education and Science of Ukraine, 2021)
Regularity	Questionnaire
Consistency	Questionnaire

The principle of the relationship between self-education and education in general secondary and higher educational institutions was studied through a pedagogical experiment. It involved several stages:

1) the methods (interactive methods, project methods, etc., independent completion of didactic assignments) that promote the development of skills and abilities necessary for self-education were used instead of traditional teaching methods

during lessons in general secondary educational institutions, as well as during lectures and practical or laboratory classes in higher educational institutions;

2) the effect of the introduced methods on the academic performance of pupils and students was studied;

3) teachers, lecturers/professors, pupils and students were surveyed to assess the impact of self-study on motivation to learn, on ensuring a differentiated approach, changes in social

interaction, as well as the development of skills and abilities required for self-education;

4) self-educational competence (purposefulness in acquiring knowledge and the need to improve existing knowledge, the ability to learn and complete didactic assignments independently, as well as independently organize the learning process and exercise self-control) was assessed by pupils and teachers, as well as by students and lecturers/professors.

A survey of nursery school teachers, school teachers and lecturers/professors was conducted in the course of researching the principle of the relationship between self-education and professional activity. The survey aimed at identifying sources of self-education that the educators use the most often, as well as the motivation for self-education. Statistical analysis of the data obtained was also carried out [29].

The regularity principle was studied through a survey of students, lecturers/professors, school teachers and nursery school teachers. School teachers, nursery school teachers and lecturers/professors were surveyed while studying the consistency issue.

The questionnaires consisting of closed-ended questions that met all ethical standards and requirements were used. The survey was voluntary, anonymous, free of charge. Parents' consent was obtained to survey minors. Respondents received all the necessary explanations before the survey. There was enough time to answer. The study was conducted during one academic year. The sample involved 78 pupils and 12 teachers from 5 secondary schools, 123 students and 17 lecturers/professors from 3 higher education institutions, as well as 14 teachers from 3 nursery schools (Table 2).

Table 2. Sample description

	Number of people				
	pupils	students	School teachers	Lecturers/professors	Nursery school teachers
Number of people	78	123	12	17	9
Age, years	14-17	18-23	25-65	25-65	25-65

IV. RESULTS

The relationship between self-education and education in general secondary educational and higher educational institutions was studied through the pedagogical experiment. The experiment involved the project method and case method,

which provide for self-learning of pupils and students, as well as independent completion of didactic assignments. The effect of the use of such methods and forms of teaching on the academic performance of pupils and students is determined. Table 3 presents the results of the analysis.

Table 3. Academic performance of pupils and students

	Average score				Maximum score
	Before the experiment		After the experiment		
	Control group	Experimental group	Control group	Experimental group	
Pupils of grades 9-11	7.4	7.3	7.8	9.2	12
Students	68	69	72	88	100

As Table 3 shows, the use of teaching methods that promote the development of self-education skills does not reduce the students' performance. The average score of pupils in general secondary educational institutions even increased by 15.8%, and that of students in higher educational institutions — by 19%.

The intergroup variance d is found, which is the weighted sum of the squares of the deviations of the group mean from the total mean. It is determined by the heterogeneity of the sample, namely the conduct of pedagogical experiments in different educational institutions included in the sample, and ranged from 247 to 1,156.

Cohen's d in the studies conducted in the experimental group was 1.0, which indicates a high effect of using project

and case methods, as well as independent completion of didactic assignments on the development of skills required for self-education. Cohen's d reached 0.6 in the control group, thus indicating a medium effect. This proves the effective use of the proposed forms and methods of teaching for the development of self-educational competence.

A survey of school teachers, lecturers/professors, pupils and students was conducted at the end of the study to establish the relationship between self-education and education. The survey was to determine the attitude of teachers and their students to self-education, as well as the advantages and disadvantages of teaching methods that provide for self-learning of pupils and students. Table 4 presents the survey results.

Table 4. Self-educational competence assessment results

Question	Percentage of “yes” answers			
	Pupils	Students	School teachers	Lecturers/professors
Are forms and methods that provide for self-learning introduced in the educational process?	37 %	83 %	83 %	94 %
Do you think that self-education helps to increase the motivation for cognitive activity?	25%	41%	67 %	77 %
Do you think that self-learning contributes to the implementation of a differential approach to learning?	21 %	57 %	75 %	83 %
Do people realize the lack of acquired knowledge in the course of self-study?	67 %	74 %	50 %	46 %
Does self-study help to improve:				
social interaction	78 %	62 %	83 %	63 %
purposefulness	26 %	54 %	75 %	83 %
independence	33 %	71 %	83 %	88 %
self-initiative	30 %	66 %	75 %	88 %
development of self-education skills	32 %	68 %	83 %	94 %
ability to complete didactic assignments	37 %	73 %	83 %	88 %
self-organization	40 %	79 %	83 %	88 %
self-control	35 %	64 %	57 %	77 %

As Table 4 demonstrates, the development of skills and abilities required for self-education throughout life shall begin while studying at school and university. Attitudes and perceptions of self-education among pupils and school teachers, as well as among students and lecturers/professors differ. There were 83% of school teachers who believed that they introduce forms and methods into the educational process that contribute to the development of self-educational competence. Only 37% of pupils share this opinion. This may indicate that pupils have not yet developed an idea of self-education.

Students are more conscious about self-education, and 83% of them believe that the institutions in which they study introduce forms and methods of learning that allow them to acquire skills and abilities required to further continue lifelong learning. They are supported by 94% of teachers in this matter. Therefore, the development of pupils’ self-educational competencies, which was started in general secondary educational institutions, is continued in higher educational institutions. This proves the adherence to another self-education principle — the consistency principle.

There were 67% of school teachers and 77% of lecturers/professors who believed that the use of teaching methods that involve self-learning of students helps to increase their motivation to learn. Students and pupils are less prone to this opinion (41% and 25% of positive answers among the

surveyed students and pupils, respectively). The attitude to the implementation of the differential approach of educators and their pupils/students is also different.

When completing independent assignments, 67% of pupils and 74% of students experience a lack of knowledge, although only 50% of school teachers and 46% of lecturers/professors believe that such a problem exists. Self-learning promotes social interaction According to school teachers and pupils (78% and 83% respectively), as well as students and lecturers/professors (62% and 63% respectively). The impression of self-education of school teachers and pupils is radically different in terms of its impact on the development of purposefulness (49%), independence (50%), self-initiative (45%), self-education skills (51%), ability to complete educational assignments (46%), self-organization (43%), self-control (22%). The assessment of the results of the impact of self-education on the development of relevant skills and abilities of students and their lecturers/professors is less differentiated (in the range of 9 - 29%). This may indicate that students have more developed self-education competencies.

A survey of nursery school teachers, school teachers and lecturers/professors was conducted to determine the relationship between self-education and professional activity, as well as the regularity and consistency principles. The survey results are provided in Table 5 and visualized in Figure 1.

Table 5. Teacher survey results

Questions	Percentage of positive answers to questions			
	Nursery school teachers	school teachers	School teachers	Lecturers/professors
What do you use as sources of self-education?				
postgraduate education programmes	78 %		83 %	88 %
advanced training courses	89 %		92 %	58 %
seminars and scientific conferences	56 %		66 %	77 %

participation in instructional projects and grants	22 %	58 %	77 %
participation in research	33 %	66 %	94 %
attending lectures	22 %	50 %	88 %
scientific and educational literature	56 %	58 %	94 %
online resources	67 %	83 %	88 %
Who/what motivates you for self-education?			
administration of the educational institution	78 %	92 %	58 %
opportunity to improve income	89 %	83 %	16 %
thriving to perform professional duties well	78 %	75 %	94 %
Are you regularly engaged in self-learning?	89 %	92 %	94 %
Do you contribute to the development of students/pupils/children self-education skills and abilities?	33 %	66 %	88 %

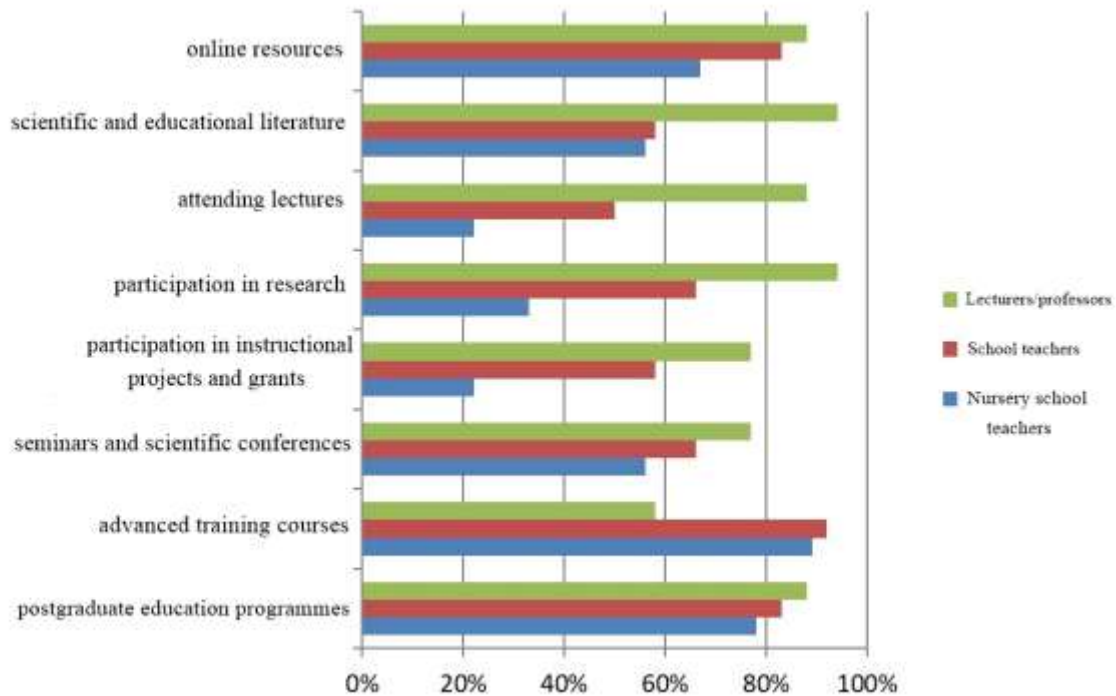


Fig 1. Sources of self-education of nursery school/school teachers, lecturers/professors

As Table 5 and Figure 1 demonstrate, teachers of different educational institutions prefer different sources of self-education. For example, school teachers and nursery school teachers most often improve their professional level through advanced training courses (92% and 89%, respectively). Lecturers/professors are actively engaged in self-education by participating in research (94%), as well as in instructional projects and grants (77%), studying scientific and educational literature (94%), attending lectures (88%), seminars and scientific conferences (77%), and using online resources (88%). Postgraduate education programmes promote self-education of both nursery school teachers (78%), school teachers (83%) and lecturers/professors (88%). All educators use online resources in lifelong learning (67% of nursery school teachers, 83% of school teachers and 88% of lecturers/professors surveyed).

The study showed (Table 5) that the internal motivation for self-education is characteristic of all teachers (94% of lecturers/professors, 78% of nursery school teachers, 75% of

school teachers). The external motivation of nursery school and school teachers is high.

Adherence to the self-education regularity principle is evidenced by the positive responses of 89% of nursery school teachers, 92% of school teachers and 94% of lecturers/professors to the question: "Are you regularly engaged in self-learning?" And the answer to the last question may indicate adherence to the self-education consistency principle.

The standard deviation from the mean percentage of positive answers to the same questionnaire questions in different educational institutions included in the sample was also different. At the same time, the intergroup variance, which describes the fluctuations of these groups, and intragroup variance, which describes the fluctuations due to random factors which were not taken into account, are not equal. This indicates the invalidity of the null hypothesis.

The relationship between self-education and professional activity can be studied through the statistical data analysis [29]. We take the Methodologist or Senior Teacher title as a

criterion for the school teacher’s professionalism. Figure 2 visualises the dynamics of the number of teachers with pedagogical education in all regions of Ukraine over the past six years. Figure 3 illustrates the dynamics of the number of Methodologists over the same period. Figure 4 shows the

dynamics of the number of teachers with the Senior Teacher title. Figures 5 and 6 display the graphical dependences of the number of Methodologists on the number of teachers with pedagogical education (by regions in 2015-2016 — Figure 5, and in Vinnytsia region for six years — Figure 6).

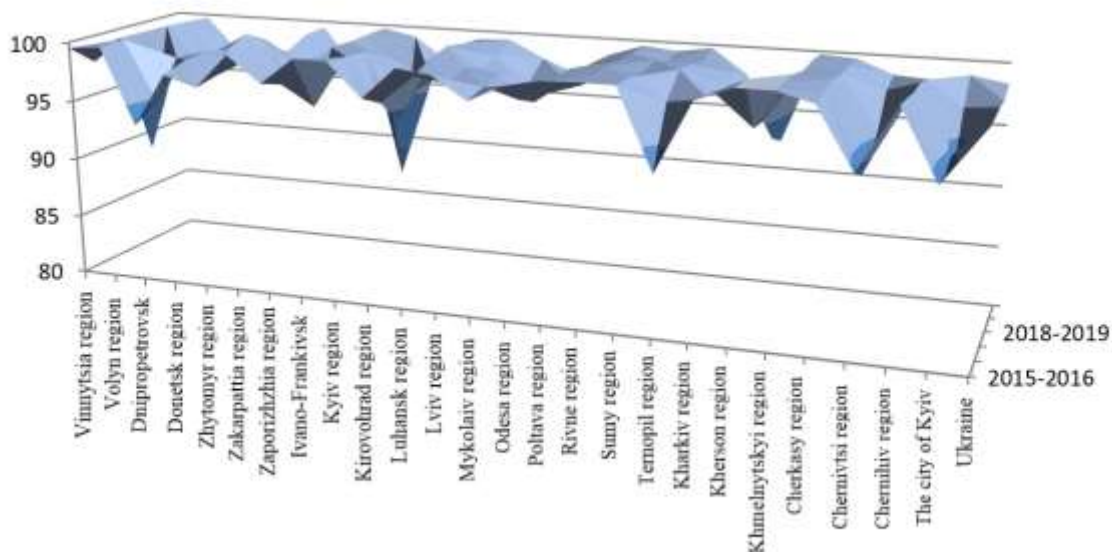


Fig 2. Dynamics of the number of teachers with a pedagogical education

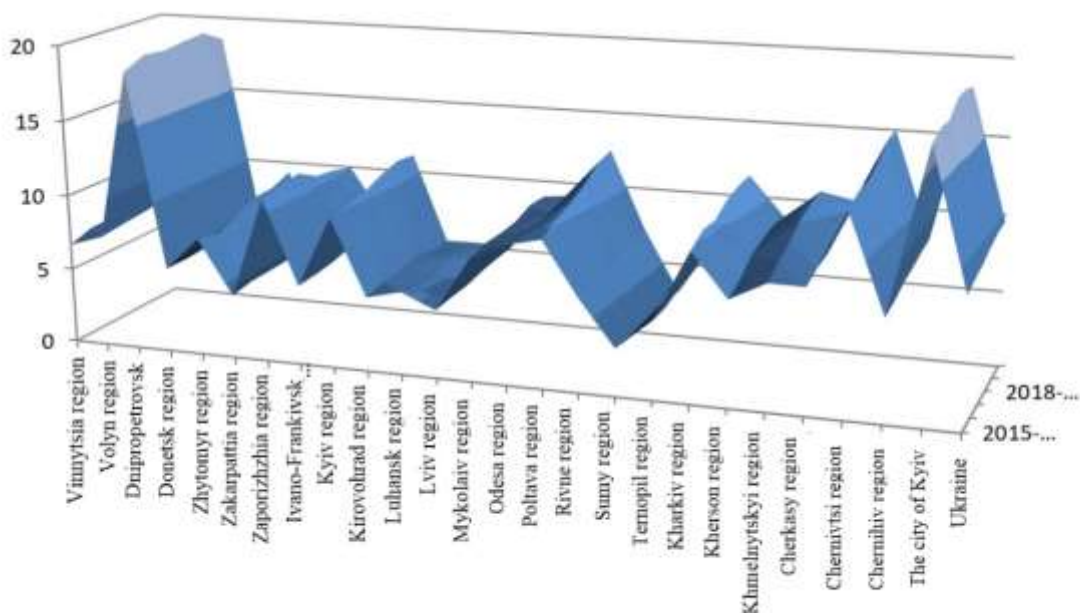


Fig 3. Dynamics of the number of Methodologists

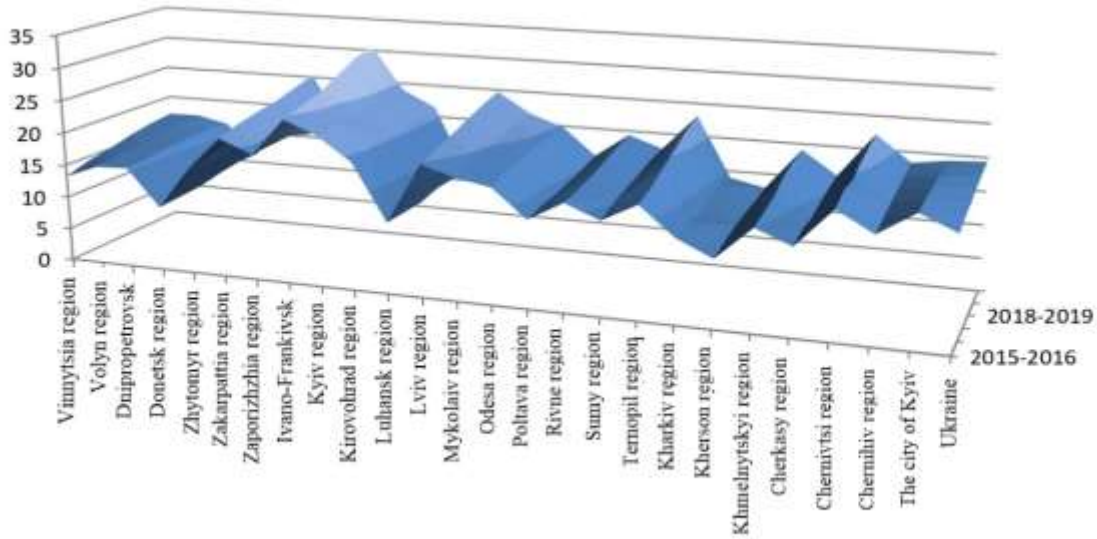


Fig 4. Dynamics of the number of teacher who have the Senior Teacher title

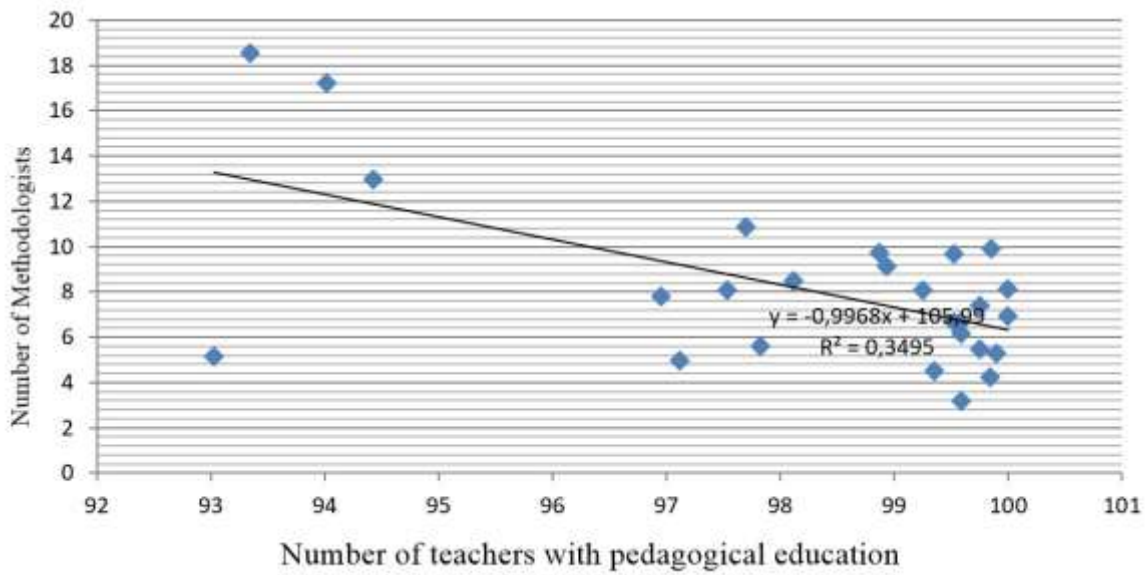


Fig 5. Dependence of the number of Methodologists in Ukraine on the number of teachers with the pedagogical education

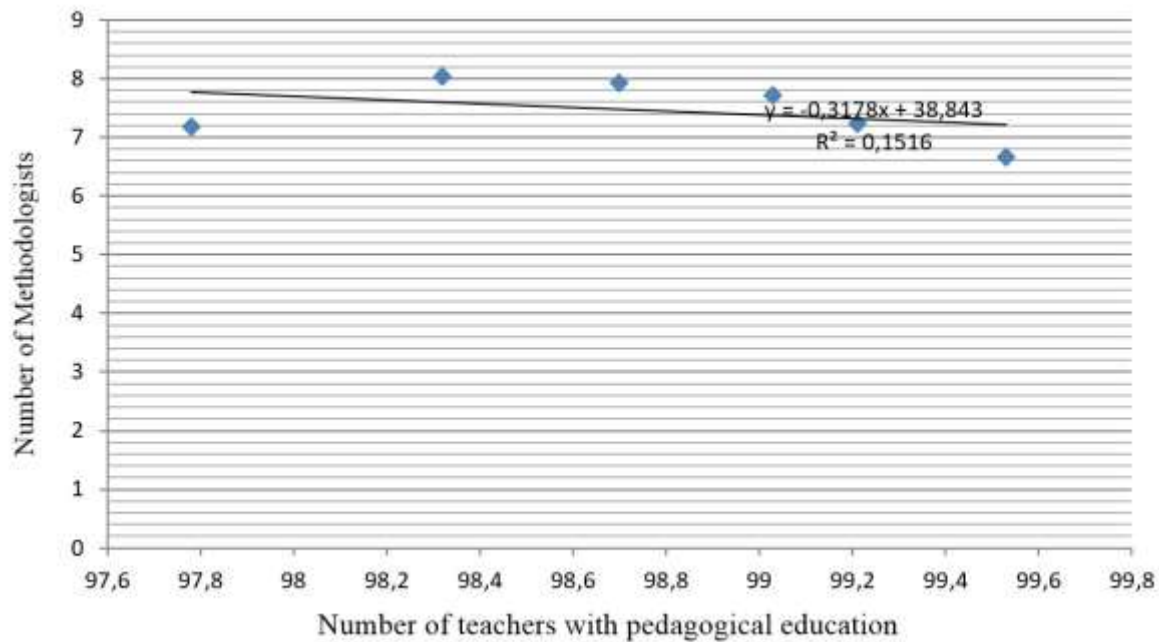


Fig 6. Dependence of the number of Methodologists in Vinnytsia region on the number of teachers with the pedagogical education

The surfaces obtained on Figures 2-4 are non-identical. The dependences obtained in Figures 5 and 6 have a negative k coefficient. This indicates that there is a significant period of time (more than 6 academic years) of painstaking independent work of teachers to improve their professional competence between the knowledge, skills and abilities acquired in the pedagogical educational institution and the real professional achievements of teachers. Therefore, teacher self-education, which is subject to the principles of regularity, consistency, relationship with education, is an important component in the development of a specialist teacher.

Therefore, as this study illustrated on the educators' example, the following self-education principles are required for lifelong learning: consistency, regularity, the relationship between education and self-education, and the relationship between self-education and professional activities.

V. DISCUSSION

The study conducted in this paper showed that adherence to the self-education principles (regularity, consistency and relationship between education and self-education) is required when studying in general secondary educational and higher educational institutions. It is necessary to use forms, methods, tools and technologies of teaching that promote the development of self-educational competence in pupils and students. The self-acquired skills and abilities during studies at the educational institutions will help specialists in learning throughout their professional lives.

A study involving 219 students in grades 8-9 demonstrated that the use of digital technologies contributes to the boost of self-esteem and improvement of self-learning skills [22]. According to scientists [13], students themselves believe that active learning methods are not highly effective in developing

self-educational skills.

Creative approach influences the teachers' professional development. It is considered that there is a direct relationship between them [28]. More creative people are more likely to engage in self-education through a variety of forms of self-education, which results in being more successful than their colleagues.

One third of students believe that educational content posted on the Internet helps in self-education [27], albeit 60% use it only at the teachers' request, not on their own initiative. And 21% of students argue that the Internet does not contribute to their self-education, while 24% of students are not going to use the Internet for education after graduation because they do not catch the relationship between self-education and professional activities. The researchers asked teachers to introduce students into the opportunities that the Internet offer, the content useful for learning to engage students in self-study through the Internet. Another way is to give students the assignment to find online websites that are useful for their future profession, for example, visit web workshops, web labs, virtual exhibitions, virtual museums. This kind of work conducted among students enabled to involve 20% of them in the use of the Internet in their self-education. A survey of students [19] confirmed the sequence of the self-education process. The scholars showed an increase in the score for self-educational competence at the first years of studies compared to the graduating ones.

Educators should engage in lifelong learning in addition to developing self-education skills in pupils and students. According to the study [30], 93% of respondents are engaged in self-education in order to improve their skills and be competitive in the labour market, while 23% of the surveyed gain confidence in their professional actions and decision-

making thanks to self-education.

The respondents, however, noted a number of obstacles to their self-education: lack of time, long distance to self-education centres and others. Self-education sources include not only advanced training courses, various programmes, grants, lectures, scientific and instructional literature, but also social networks [31] as a source of information required for professional development.

School teachers and lecturers/professors introduce different forms and methods of teaching to promote the development of self-education skills in pupils and students: project and case methods [1], as well as learning models such as Shenben [32]. The following personal characteristics of students are required for them to be able to engage in self-education: self-discipline, motivation, ability to make independent decisions and take responsibility, adapt quickly, have information literacy [19]. In their turn, educators must be highly qualified, responsible, disciplined, self-critical, creative and optimistic [30].

VI. CONCLUSIONS

How well the specialists of a particular branch perform their professional duties determines the quality of life of the whole society. Each member of society must engage in continuous self-learning to improve their skills and abilities. Therefore, the development of self-educational competence is a current and urgent problem, as the specialists' ability to improve their professional skills throughout life depends on the self-education skills acquired while studying in educational institutions. According to this study, it is necessary to use different teaching methods that promote the development of self-educational skills in order to develop self-educational competence in students during their studies at the educational institutions.

The involvement of project method, case method, independent completion of didactic assignment promotes the development of motivation, activity, purposefulness, independence, self-organization, self-control, implementation of a differential approach, while having a positive effect on student performance. It is necessary to adhere to the principles of regularity, consistency, the relationship of self-education with education and self-education with professional activities in the course of developing self-learning skills. Both advanced training courses, literature and social networks can be sources of self-education in professional life.

The study is of practical importance for scholars and educators who work on the development of their students' self-education skills and abilities, as well as those who are engaged in self-study.

Further efforts of researchers may be focused on the development and analysis of the effectiveness of teaching methods that promote the development of self-educational competence of pupils, students and specialists in various fields.

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